The Occupational Stress Inventory-Revised

Confirmatory factor analysis of the original inter-correlation data set and model

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Abstract

Stress levels are said to be rising in many different occupations but one problem for cross-occupation comparison purposes is that different questionnaires have been used in different studies- often specially designed questionnaires for the occupation under study. The Occupational Stress Inventory- Revised (OSI-R) is one questionnaire that may help assess the same stress-related variables across different occupational groups. The OSI-R model is theory-based and assesses the effects on the individual of three 'factors' (occupational roles, psychological strain and coping resources) across fourteen dimensions. This current study reports the findings of a re-analysis of the original Manual data of 983 mixed occupational respondents of the OSI-R, using confirmatory factor analyses of the inter-correlations given of the 14 dimensions. The findings show that the three-factor solution is not optimal (though two of the three original factors are accurately reproduced) and that a four-factor solution better fits the responses, but with more error than desirable in both solutions. This finding is consistent with an earlier confirmatory factor analysis of the responses of 141 teachers which suggested that a four-factor rather than three-factor solution was preferred. Implications for use of the OSI-R and for further research are drawn.

The Occupational Stress Inventory-Revised: Confirmatory factor analysis of the original inter-correlation data set and model

Occupational stress seems to be a universal phenomenon, with many studies of different occupations suggesting stress levels are rising- for example, among managers, educationists, and in the health and service industries (e.g., Brown et al., 2002; Cooper, 1998; De Jonge, Le Blanc, Peeters, & Noordam, 2008; Dollard & Winefield, 1996; Hicks, Fujiwara & Bahr, 2006; Kinman, 2001; La Montagne, Keegle, Louie, Ostry, & Landsbergis, 2007; Lewig & Dollard, 2003; Mearns & Cain, 2003; Naylor, 2001; Osipow, 1998; Peterson, 2005, 2007; Rudow, 1999). However, few standardised models of stress measurement exist that enable comparisons across professions assessing stress and its mediators or moderators and outcome effects. There is limited information on the constructs of the models that do exist. Models that include both psychological and environmental input seem likely to cover the main variables of importance in stress measurement and explanation (cf., Dollard & de Jonge, 2003; LaMontagne, Keegel, & Vallance, 2007).

The Occupational Stress Inventory-Revised (OSI-R) (Osipow, 1998) is the result of one such model of stress that incorporates the major variables impacting on stress or the outcomes of stressful situations and this questionnaire has the potential to provide comparative data across professional groups (Hicks et al., 2006). The OSI-R was built on a broad theoretical base and has normative data across several professional groups. The OSI-R assesses three inter-related overall dimensions or factors each important in the experiencing of occupational adjustment-- occupational role stress, personal strain and

coping resources—each assessed through a 'questionnaire' as part of the overall Questionnaire. Occupational role stress includes six sub-scales: role overload, role insufficiency, role ambiguity, role boundary, role responsibility and physical environment. Personal strain includes four subscales: vocational strain, psychological strain, interpersonal strain and physical strain. And coping resources includes four subscales: recreation, self-care, social support and rational/cognitive coping.

The OSI-R theoretical model of stress (the OSI model) hypothesises that work environment stressors and coping resources influence perceptions of work roles; that interactions between work stressors and stress-inducing work roles, produce personal or psychological strain; with that strain influenced also by the variety, strength and level of coping resources of the individual.

However, are these major variables (occupational role stressors, coping resources and experienced strain) assessed effectively within the OSI-R (the model chosen to operationalise the theory)? That is, does the model "hold up", and would it do so in a re-analysis of the original Manual data? A confirmatory factor analysis of 141 secondary school teachers (Fujiwara, 2004; Hicks, et al., 2006) had partially supported the model but suggested the underlying structure of the model needed further study and might include a four-factor rather than three-factor model solution. These questions and rationale were behind the current confirmatory study of the three-factor or three-dimensional model underlying the OSI-R, and the subsequent proposed four-factor model. This current study revisits the Manual data (Osipow, 1998) and reports on the findings of confirmatory factor analyses of the data given within the Manual.

METHOD

The survey sample response consisted of 983 mixed workplace respondents (Osipow, 1998). A table of inter-correlations of the 14 sub-scales of the OSI-R was available (Osipow). It was decided to examine whether a three-factor or a four-factor model better explained the underlying concepts or latent structure of the questionnaire. As indicated above, the three main dimensions are made up of sub-scales. Summing the relevant sub-scales gives the overall results for the dimensions. All 14 scales have high levels of reliability (alpha coefficients between 0.70 and 0.89; Osipow, 1998, p.26). The inter-correlation matrix presented in the Manual (Osipow) was used to provide the basic input data for the analyses.

RESULTS

Procedure: The Occupational Stress Inventory's latent structure was examined using Confirmatory Factor Analysis to compare the fit of the standard 3 factor model with that of a 4 factor model proposed by Hicks, et al. (2006) from a study of teachers. To investigate this issue 3 and 4 factor Confirmatory Factor Analysis was conducted on the correlation matrix of the normative data for the OSI-R using EQS 5.3. Correlational data were available for 983 subjects.

General finding: Neither the 3-factor nor the 4-factor solutions exhibited absolute fit. However, a difference chi-square indicated significantly better fit for the 4 factor solution than the 3 factor solution ($\chi^2(1) = 393.45$, $p < .001$). In both instances the *model fit*

statistic indicated poorer fit of the solutions to the normative data than for the teacher data reported in Hicks, Fujiwara and Bahr (2006) (see Discussion).

The three-factor solution: The model chi-square for the 3-factor solution (Figure 1) revealed significant variation between the data and model ($\chi^2(62) = 1045.81$, $p < .001$) indicating poor overall fit. Model Chi square is notoriously unreliable in the face of a large n. The ratio of critical value to df is also unacceptably large indicating that the scale is not well represented by the 3-factor solution. Generalised fit indices are stable and consistent indicating that there is general fit between the data and the 3-factor solution but the indices indicate that the fit between data and model is unacceptably low (NFI =.79, NNFI = .75, CFI = .80, GFI =.86, and AGFI = .79). Ideally these values should exceed .90. The RMSEA indicated that the solution had acceptable levels of residual variance indicating that despite the apparent misfit between model and data the domains of occupational stress may be adequately covered. The unexplained residual variance is limited to about 8% for the 3 factor solution (RMSEA = .08). See discussion for further comment.

Figure 1: The 3 - factor solution –

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The four-factor solution: The 4 factor model (Figure 2) also shows inadequate fit ($\chi^2(48) = 652.36$, $p < .001$) although it is a significant improvement over the three factor solution in terms of both the model chi-square and the fit functions (NFI =.88, NNFI = .81, CFI = .89, GFI =.91, and AGFI = .83. Overall unexplained variance was low and marginally acceptable (RMSEA = .08). The four factor solution converged in 9 iterations, compared to 10 iterations for the 3 factor solution.

Figure 2: The 4-Factor solution
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DISCUSSION

Overall the four-factor solution performed better than the three-factor solution, though neither was a good fit. It would seem that further refinement of the model is likely to result in an improvement of model fit beyond that of the four factor solution. Further research is ongoing to examine what that refinement might involve, but there is evidence in the two confirmatory factor analysis models (1A and 1B) and from the previous confirmatory study with teachers that the refinements will occur within the Occupational

Roles Questionnaire and not either of the other two (Personal Strain Questionnaire; Personal Resources Questionnaire) where the respective sub-scales hung together very well (see Figure).

The fact that the 3- and 4-factor *goodness of fit* solutions were not as good as the results of the Hicks et al. (2006) teacher study, probably reflects the relative homogeneity of the teacher data as compared to the normative (Manual) sample, and inflation of the Chi-square statistic as a function of sample size (Bentler, 1981). However, the general model fit indices were typically more consistent and higher for the *normative* data than for previously reported data. This is also likely to reflect the stability arising from the large available n (983) in this study as compared to the relatively small sample n (141) used in the previous study.

The main implication of the finding is that a four-factor model reflects better the latent structure of the OSI-R than the three-factor model, but advances might concentrate on the Occupational Roles Questionnaire and how it operates.

Should the OSI-R *not* be used by researchers and practitioners because of the non-fit findings to the model? Not at all. There are 14 sub-scales in the OSI-R: each is substantial and involves 10 items each in measurement. The 14 individual scales all continue to provide highly reliable and individual measures of the roles faced, reflections on the environment, the strain experienced and the coping resources used by the individual. The findings in fact confirm two of the three dimensions/factors where the summed total scores are relevant and provide clear information: Personal Strain, and Personal Resources.

How the six sub-scales of the Occupational Roles Questionnaire (the third dimension/factor in the Occupational Stress Inventory-Revised: OSI-R) might best be explained was tentatively suggested in Hicks et al. (2006) as involving at least two dimensions/factors: of "*Role Clarity*" (comprising Role Insufficiency, Role Ambiguity and Role Boundary), and "*Role Workload*" (comprising Role Overload and Role

Responsibility), with one sub-scale standing independently (the Physical Environment scale, as an aspect contributing to stress). The current study has shown that a four-factor solution such as the one suggested better explains the latent structure of the OSI-R, but further research into how the Occupational Roles Questionnaire in particular operates is needed.

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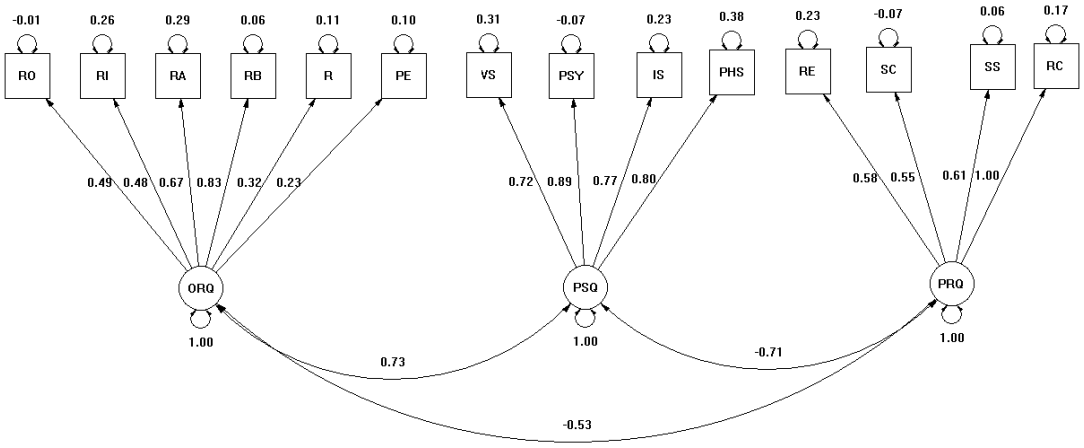
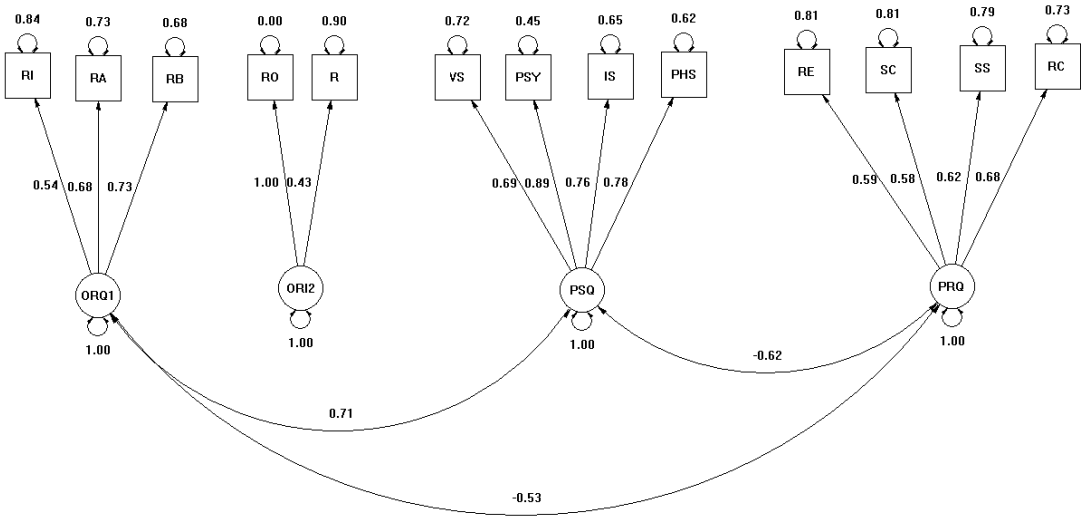


1A: The 3 - factor solution (above)



1B: The 4-Factor solution (above)

Figure 1: Comparison of the 3-factor and the 4-factor solutions

Notes to Fig 1:

ORQ = *Occupational Role Questionnaire* with RO = role overload; RI = role insufficiency; RA = role ambiguity; RB = role boundary; R = responsibility; PE = physical environment

PSQ = *Personal Strain Questionnaire* with VS = vocational strain; PSY = psychological strain; IS = interpersonal strain; PHS= physical strain

PRQ = *Personal Resources Questionnaire* with RE = recreation; SC = selfcare; SS = social support; RC = rational/ cognitive coping